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99.LMILG

2. Patent application number
(The Patent Office will fill in this part)

9920098.2

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

SMITHS INDUSTRIES PUBLIC LIMITED COMPANY
765 FINCHLEY ROAD
LONDON
NW11 8DS

Patents ADP number *(if you know it)*

If the applicant is a corporate body, give the country/state of its incorporation

GB 7257050002

4. Title of the invention

MEDICO-SURGICAL APPARATUS

5. Name of your agent *(if you have one)*

J. M. FLINT

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

765 FINCHLEY ROAD
LONDON
NW11 8DS

Patents ADP number *(if you know it)*

10632720002

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Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

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Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
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YES

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	
Description	6
Claim(s)	2
Abstract	1
Drawing(s)	3+3

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Priority documents	
Translations of priority documents	
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Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature J M Flint Date 25/08/99

12. Name and daytime telephone number of person to contact in the United Kingdom J.M. FLINT 020 8457 8220

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MEDICO-SURGICAL APPARATUS

This invention relates to medico-surgical apparatus such as laryngeal masks and cuffed medico-surgical tubes.

Laryngeal mask airways are used to ventilate and to supply anaesthetic gas to a patient during surgery. Laryngeal mask airways differ from endotracheal tubes, which extend into the trachea and terminate beyond the vocal folds. By contrast, laryngeal mask airways have a tubular shaft opening into the centre of a generally elliptical mask or cuff, which is inflated to seal in the region of the hypopharnyx, at the top of the trachea. The cuff is inflated with air supplied along a small-bore inflation line communicating with the interior of the cuff. The inflation line is not usually attached with the tubular shaft, which can be an inconvenience because it complicates packing and use of the airway. Laryngeal masks are described in, for example: US 5355879, US 5305743, US 5297547, US 5282464, GB 2267034, US 5249571, US 5241956, US 5303697, GB 2317830, GB 2249959, GB 2111394, EP 448878, US 4995388, GB 2205499, GB 2128561, GB 2298797, GB 2321854, GB 9900596, GB 2323289, GB 2323290, GB 2318735 and GB 2330312.

A problem generally with cuffed medico-surgical tubes, such as laryngeal masks and tracheal tubes is that the users often wish to cut the machine end of the shaft of the tube to length in order not to have an excessive length of tube protruding from the mouth or nose. In tubes having an inflation line attached to the main shaft, the presence of the inflation line limits the extent to which the tube can be cut to length.

It is an object of the present invention to provide alternative medico-surgical apparatus.

According to one aspect of the present invention there is provided a laryngeal mask airway including a tubular shaft with a channel extending along its external surface; a mask portion mounted at the patient end of the shaft, the mask portion having a mount member mounted on the shaft and an inflatable cuff mounted on the mount member such that the cuff can be inflated to seal with surrounding tissue, the mount member having a channel extending between the cuff and the channel on the shaft; and an inflation line extending within the channel along the shaft and within the channel in the mount member to communicate with the interior of the cuff.

According to another aspect of the present invention there is provided a medico-surgical tube having a main tubular shaft having a main lumen and a small-bore minor lumen extending along the wall of the main shaft, the minor lumen being provided at least in part by a small diameter tube attached along a part of its length with the main shaft in a manner such that it can be detached from the tube to reduce the length of tube attached with the shaft.

The small diameter tube preferably extends in a channel along the outside of the main shaft, the channel being shaped such as mechanically to retain the small diameter tube whilst allowing the tube to be pulled away from the channel. Alternatively, the small diameter tube may be held with the main shaft by means of a rupturable bond. The medico-surgical tube is preferably a cuffed tube, such as a tracheal tube or laryngeal mask, and the minor lumen preferably opens into the cuff.

A laryngeal mask airway according to the present invention, will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of the airway;

Figure 2 is a sectional side elevation view of the airway;

Figure 3 is a transverse section across the airway along the line III-III of Figure 2 to an enlarged scale;

Figure 4 is a view of the airway from below; and

Figure 5 is a sectional side elevation view of an alternative airway.

With reference to Figures 1 to 4, the airway includes a curved tubular shaft 1 of a bendable plastics material having a channel 2 in the form of a groove extending along its length on its outside surface and on the inside of its curve. The shaft 1 is preferably made by extrusion and may be reinforced by means of an embedded helical element, such as of metal or plastics. At its patient end 3, the shaft 7 is attached to a mask portion 5.

The mask portion 5 comprises a mount member 50 of a relatively stiff but compliant plastics material and an inflatable cuff 60 attached to the mount member. The mount member 50 has a tubular collar 51 within which the forward, patient end 3 of the shaft 1 is joined. The

collar 51 joins with the main part 52 of the mount member 50, which flares outwardly into a bell shape with a forward, patient end surface 53 of oval or elliptical shape inclined at an angle of about 30° to the axis of the collar. The mount member 50 is open at its forward end communicating with the bore 10 of the shaft 1 via a domed atrium 54. A channel 55 in the form of a groove extends along the inside of the mount member 50 in line with the groove 2 along the shaft 1 and this opens through a hole 56 into the cuff 60.

The cuff 60 may be of any conventional form, such as described in GB 2323291 or GB 2321854. The cuff 60 is only shown schematically in the drawings but is of annular, elliptical shape, being attached to the forward end surface 53 of the mount member 50. The cuff 60 is of a thin, flexible plastics material so that it can be deflated to a low profile for insertion and can be inflated to seal with surrounding tissue when correctly positioned.

The airway also includes an inflation line 70 in the form of a small-diameter flexible plastics tube extending along the groove 2 in the shaft 1, with the patient end of the tube extending along the groove 55 in the mount member 50 and projecting through the hole 56 into the cuff 60. The cuff 60 is sealed with the outside of the inflation line 70 so that it opens into the interior of the cuff. The rear, machine end of the inflation line 70 is attached to a combined inflation indicator balloon and connector 71 of conventional kind. The groove 2 in section forms the major part of a circle, so that the inflation line 70 is retained in the groove mechanically, although it is preferably also bonded into the groove close to the patient end of the shaft 1, such as by means of a solvent or adhesive. A number of lateral notches 20 are spaced from one another along the machine end of the groove 2. The size of the notches 20 is such as to allow the inflation line 70 to extend out of the groove 2 through a notch. The

airway is supplied with the inflation line 70 extending out of the groove 2 through the notch 20 closest to the machine end of the shaft 1. If the user wishes to cut the shaft 1 shorter, at a location forwardly of where the inflation line 70 extends from the shaft, he simply pulls the inflation line away from the shaft so that it peels out of the groove 2 to the next notch 20, or to any other notch, thereby reducing the length of the inflation line attached with the shaft. In this way, the inflation line 70 is kept neatly with the shaft along most of the length of the shaft 1 but the shaft can be cut to any desired length. There are other ways in which the inflation line could be attached with the shaft, such as by means of a rupturable adhesive or other bond. It will be appreciated that this form of peelable attachment of a small-bore line could have applications in other tubes having a minor lumen and where it is desirable to be able to alter the length of the small-bore line attached with the main shaft, such as endotracheal tubes.

Securing the inflation line 70 to the shaft 1 along most of its length avoids any loose tube within the patient's mouth and ensures that the inflation indicator and connector 71 are readily accessible outside the mouth. Reliable assembly of the airway is facilitated by this arrangement compared with alternative arrangements employing an extruded small-bore lumen within the wall of the shaft since, in such arrangements, connection needs to be made to both ends of the bore. The present invention can also be used with shafts that are reinforced.

It is not essential that the channel in the mount member extend along its inner surface; it could extend along an outer surface, as shown in Figure 5, where similar features to those in Figures 1 to 4 are given the same numbers with the addition of a prime '. In this

arrangement, the groove 55' extends along the outside of the mount member 50' so that the inflation line 70' can run along the groove and open into the cuff 60'.

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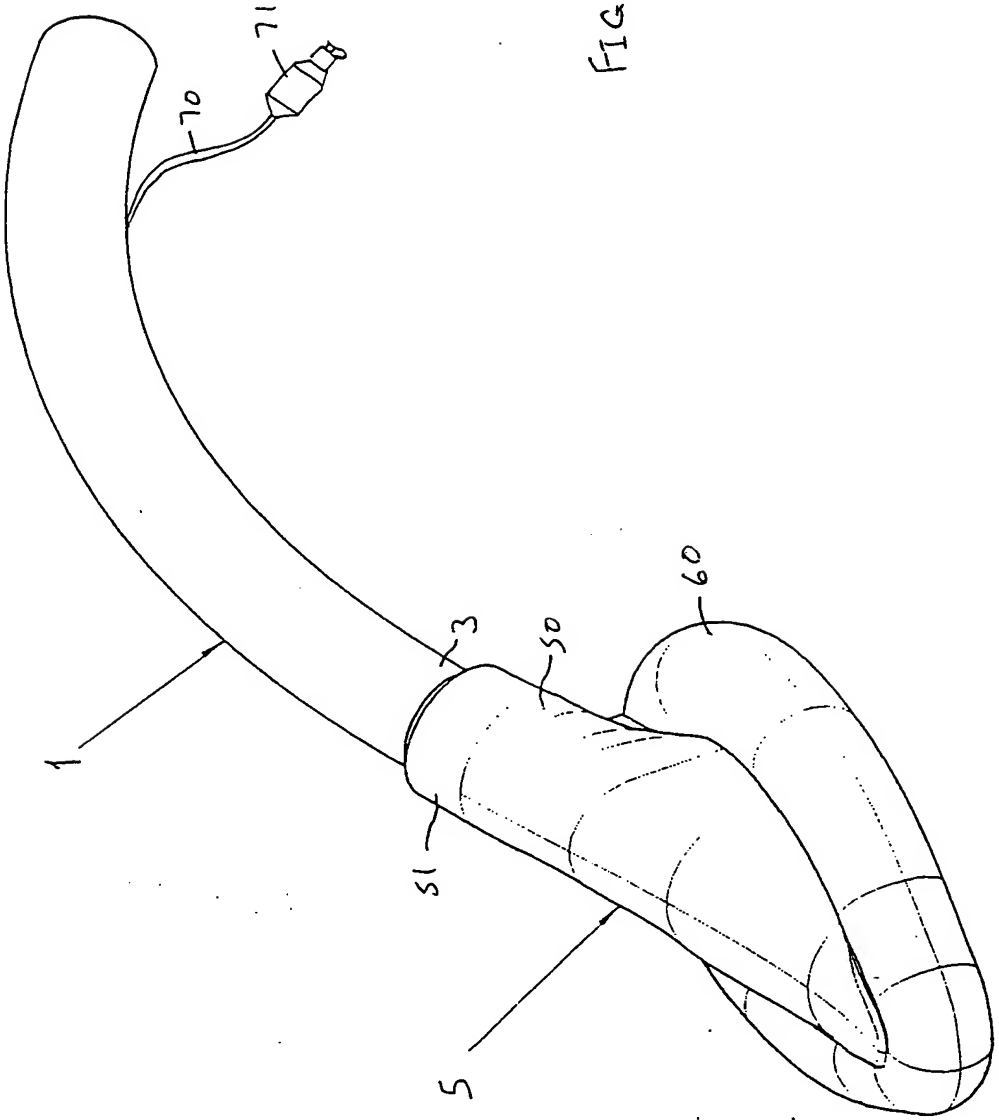


FIG. 1

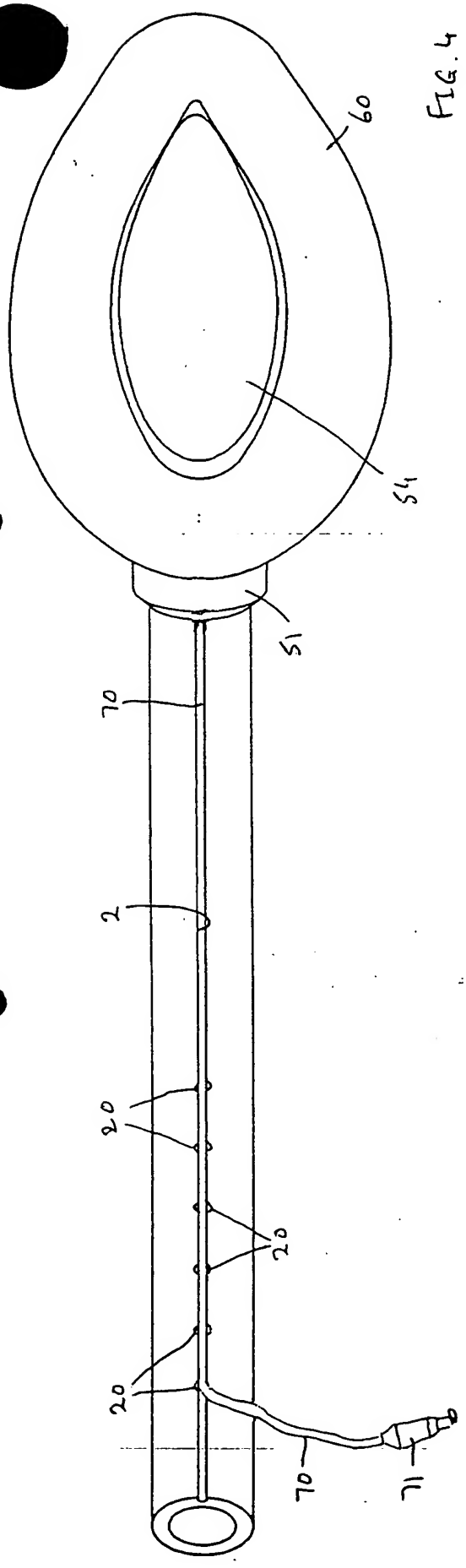
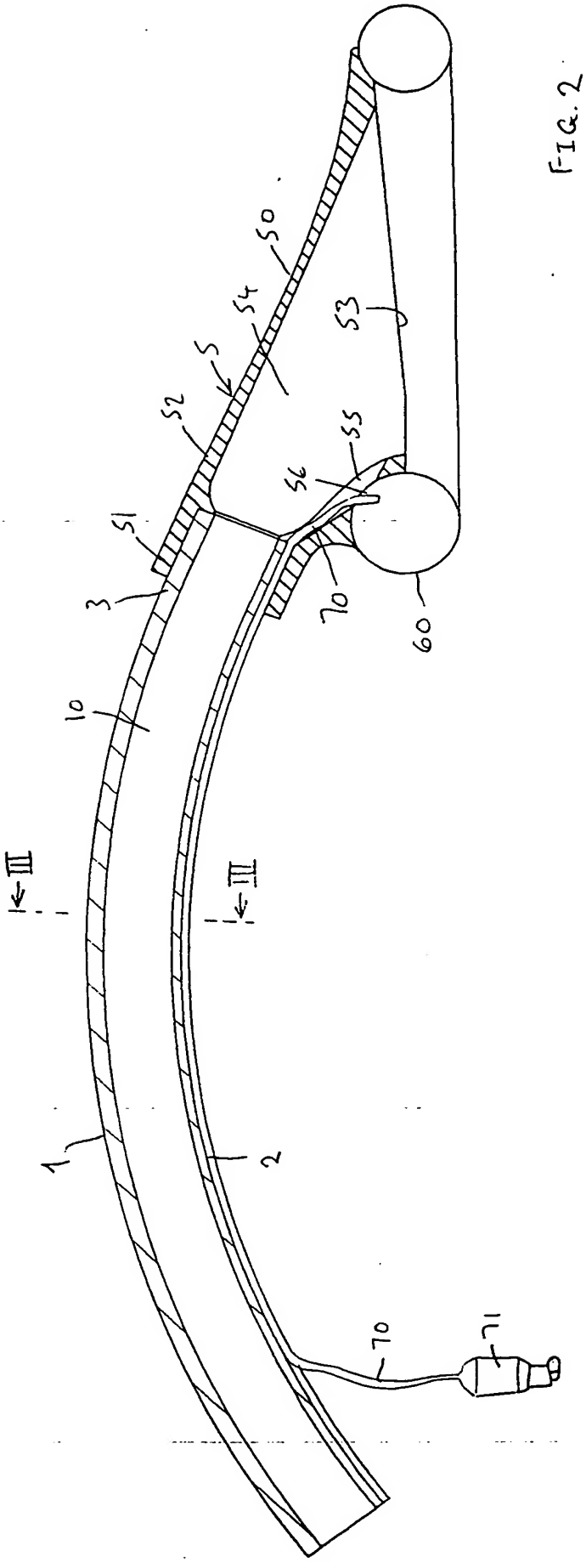

60
54
51
70
2
20
20
20
70
71

FIG. 4


50
54
5
53
52
55
56
51
3
70
60
10
III
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1
2
70
71

FIG. 2

FIG.5

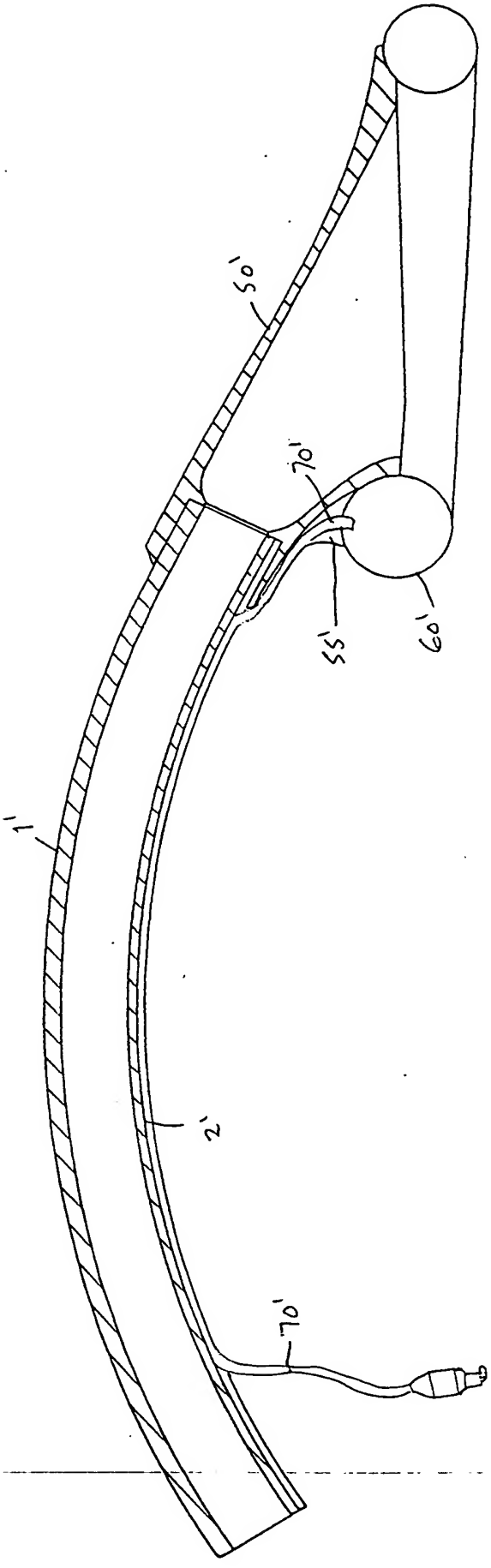

FIG.3